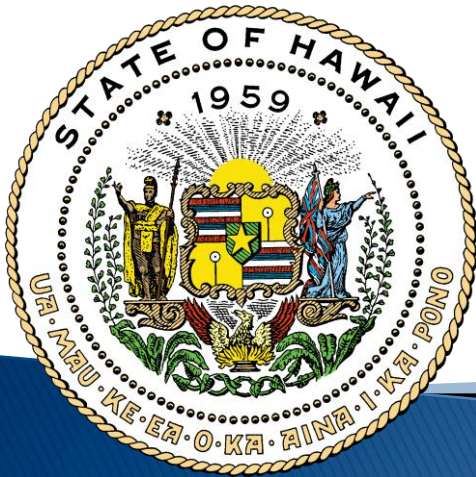


# Hawaii: An Emerging LNG Market

2014 LPGA Conference  
Singapore  
February 26, 2014



Presented by Richard Lim, Director

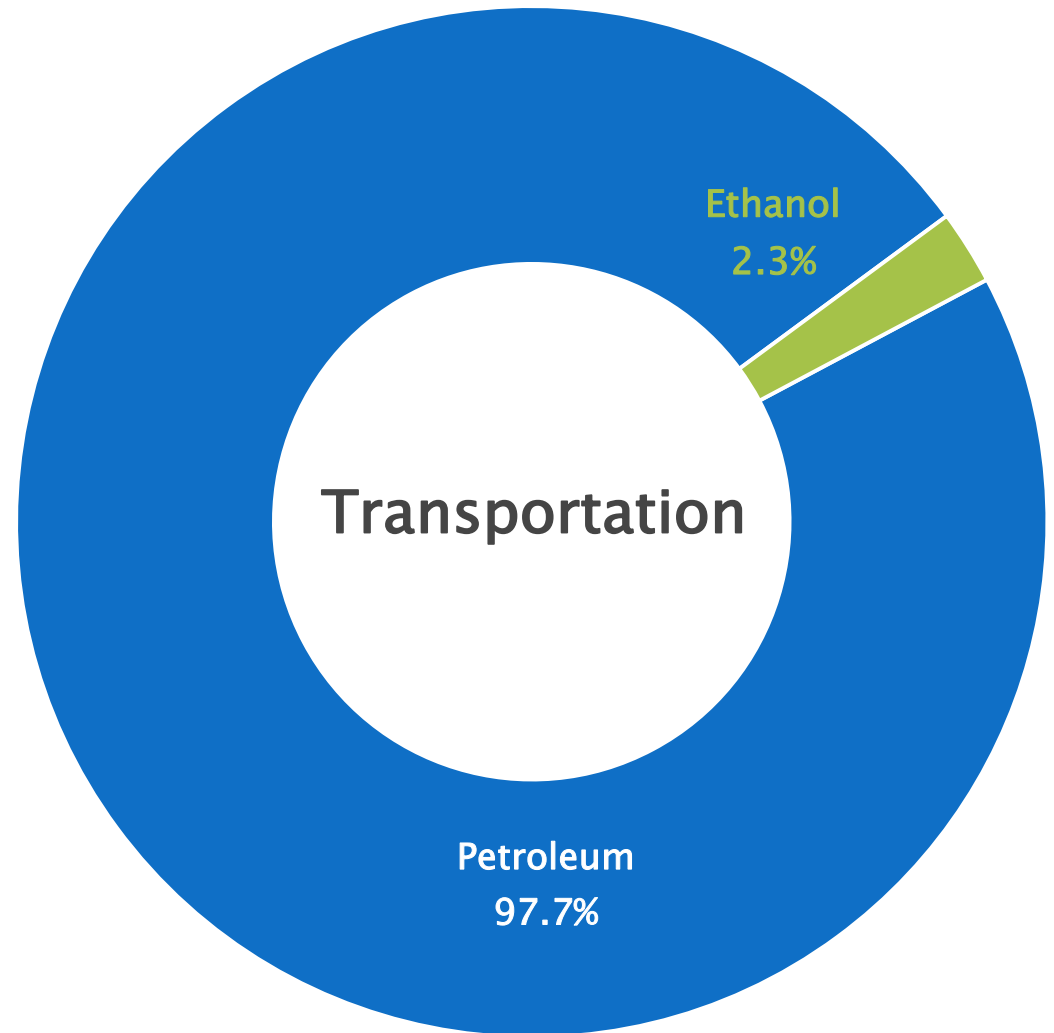
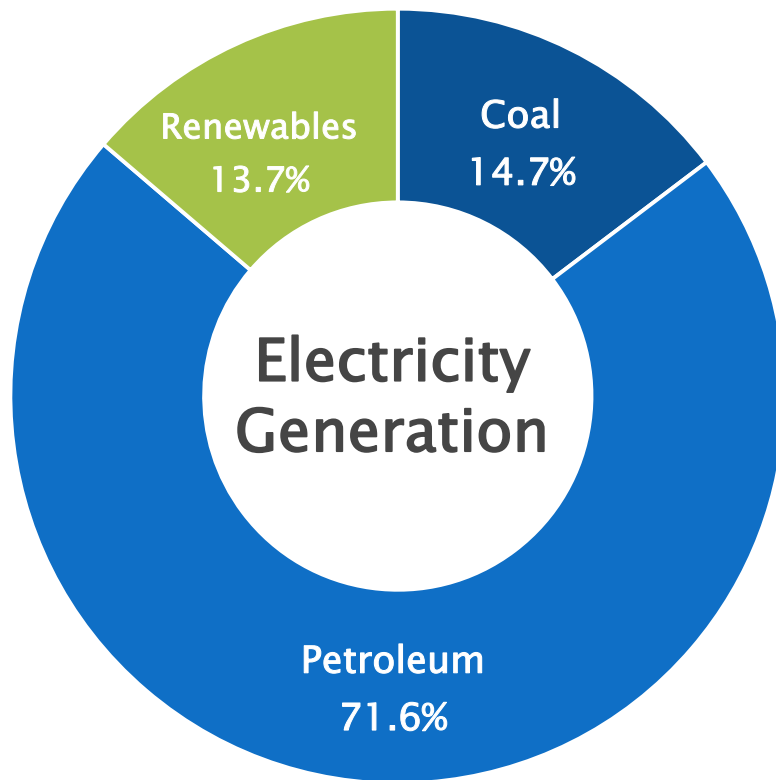
Hawaii State Department of Business, Economic Development & Tourism  
<http://energy.hawaii.gov>

# Most Isolated Population Center on Earth



# Hawaii's Energy Profile

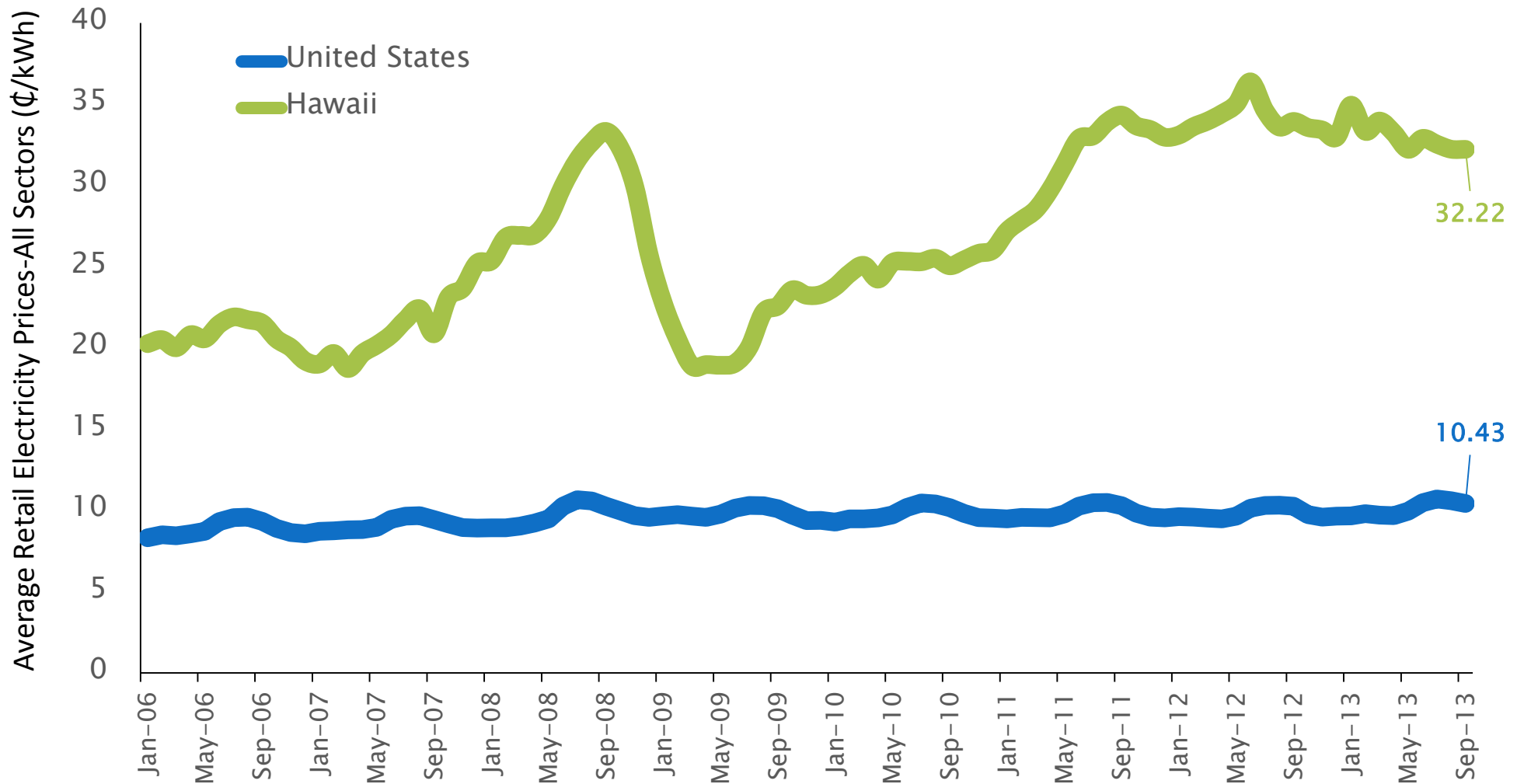
*Hawaii's current fuel mix for electricity generation and transportation consists predominately of petroleum products*



Source: EIA, Hawaii Public Utilities Commission

# High Electricity Prices

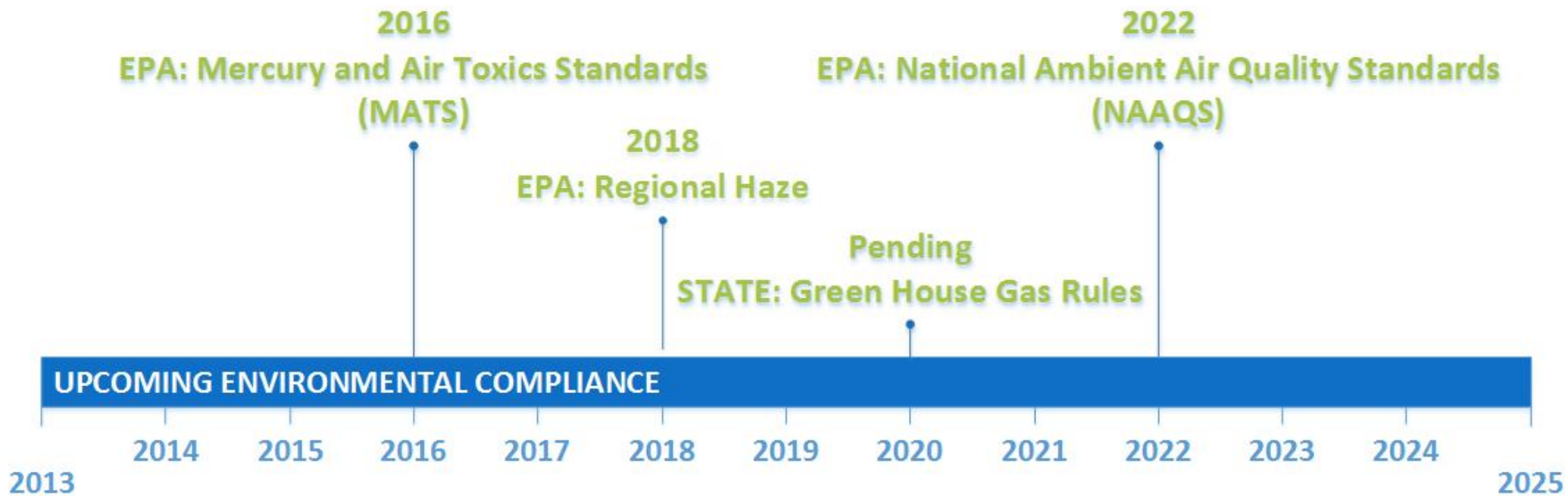
*Hawaii's electricity prices are over 3 times higher than the US average*



Source: EIA, Hawaii Department of Business, Economic Development and Tourism

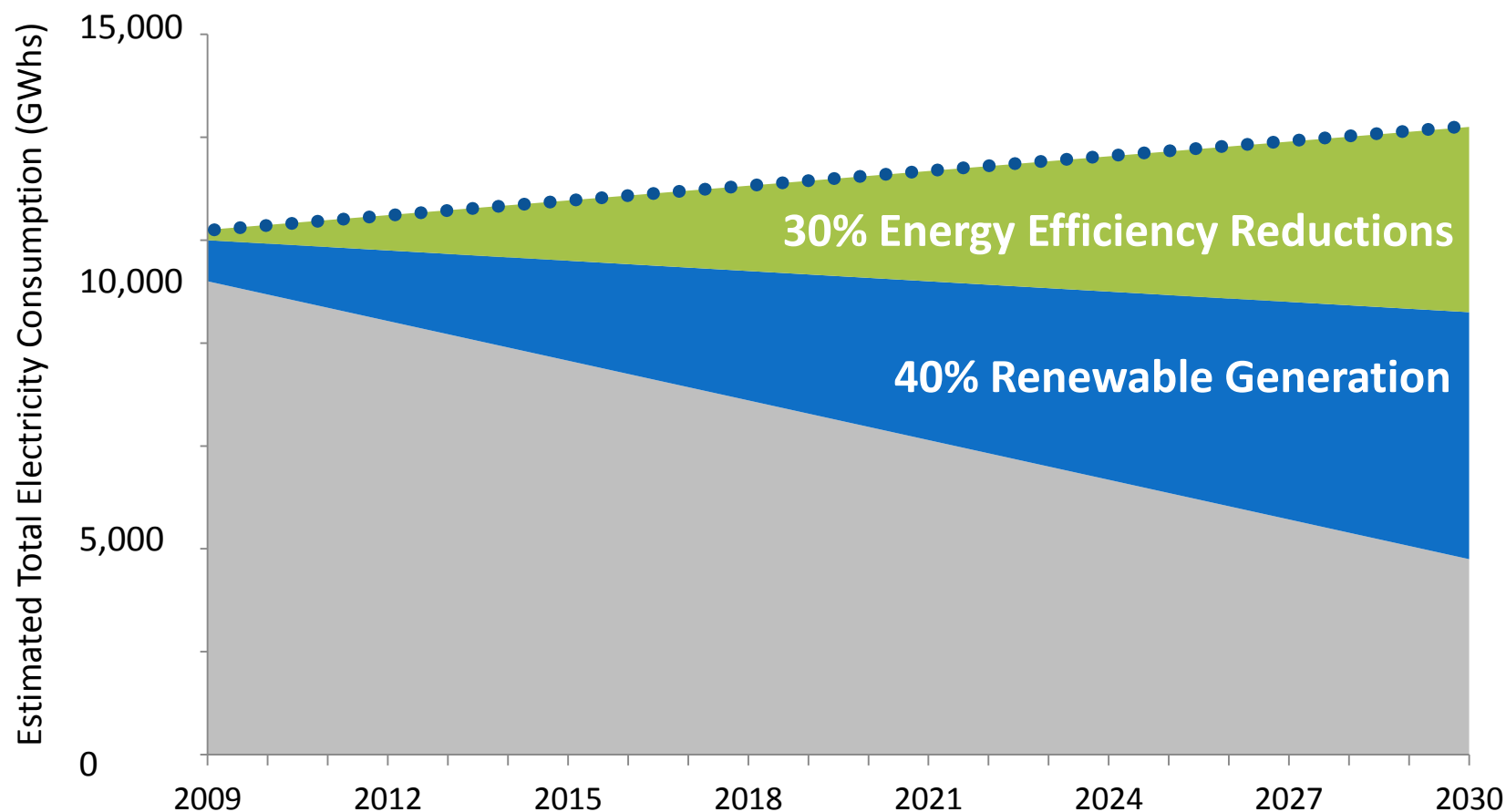
# Impending Environmental Regulations

*Upcoming environmental regulations require cleaner fuels and sources of energy to meet compliance requirements*



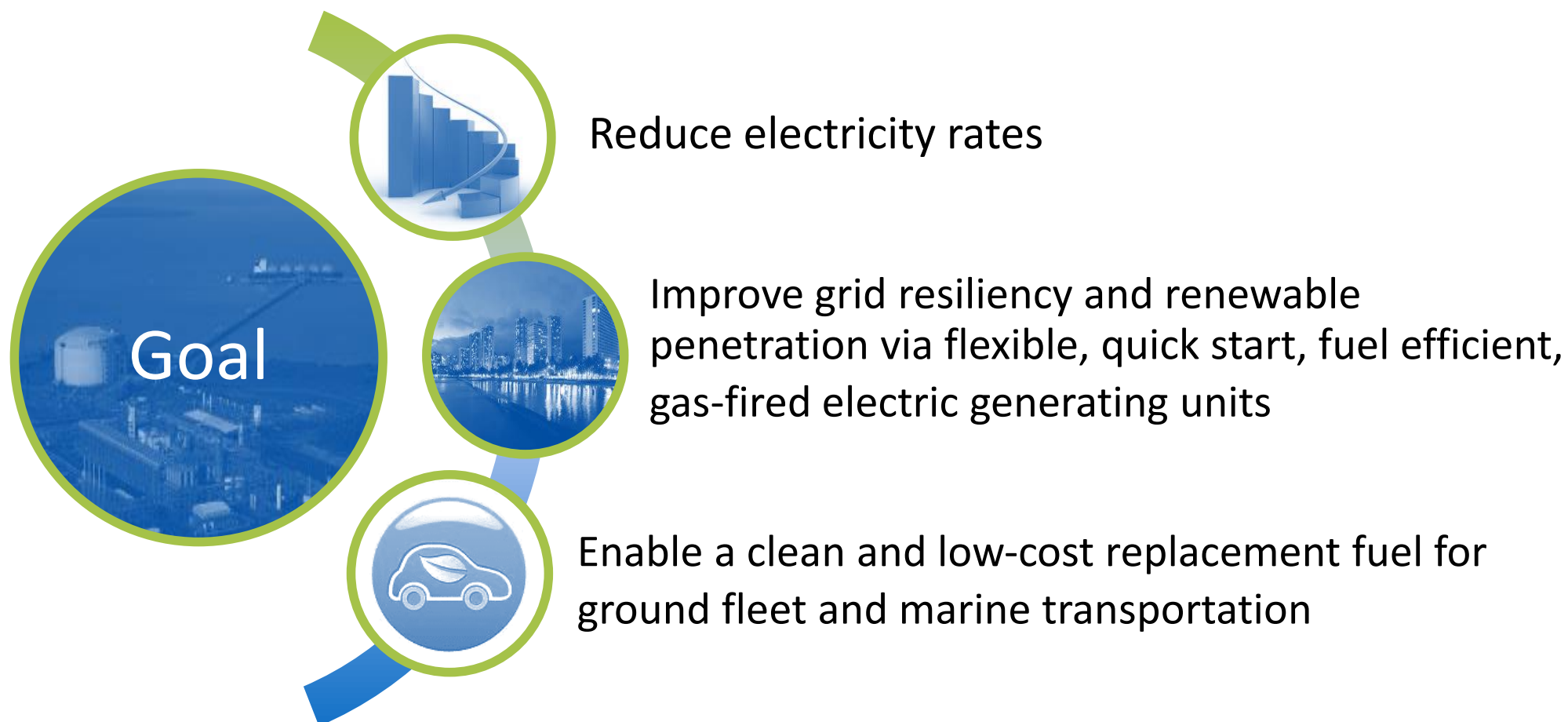
# Increasing Renewable Penetration

*Enacted in 2008, the Hawaii Clean Energy Initiative (HCEI) is leading the way in relieving our dependence on oil by setting goals and a roadmap to achieve 70% clean energy by 2030*



# Role of LNG in Hawaii

*LNG is viewed as a transitional replacement for residual oil and other petroleum products in current fuel mix*



# Potential Sectors For LNG Conversion

*Availability of natural gas in ISO container & bulk offers significant energy conversion opportunities*

## Natural Gas Uses

### Thermal Loads

Displace SNG

- Pipeline gas on Oahu

Industrial / Commercial

- Direct gas sales via pipeline / ISO

Lower Cost by 30% to 50%

### Power Generation

Power Gen

- Utilities
- IPPs
- Navy, Other Military
- Primarily conversion of existing plants

DG / CHP

Lower Cost by 25% to 30%

### Marine Transportation

Marine Transport

- Interisland fleet; possible US trade
- Commercial container and bulk carriers
- Others

Lower Cost by 35% to 50%

### Ground Transportation

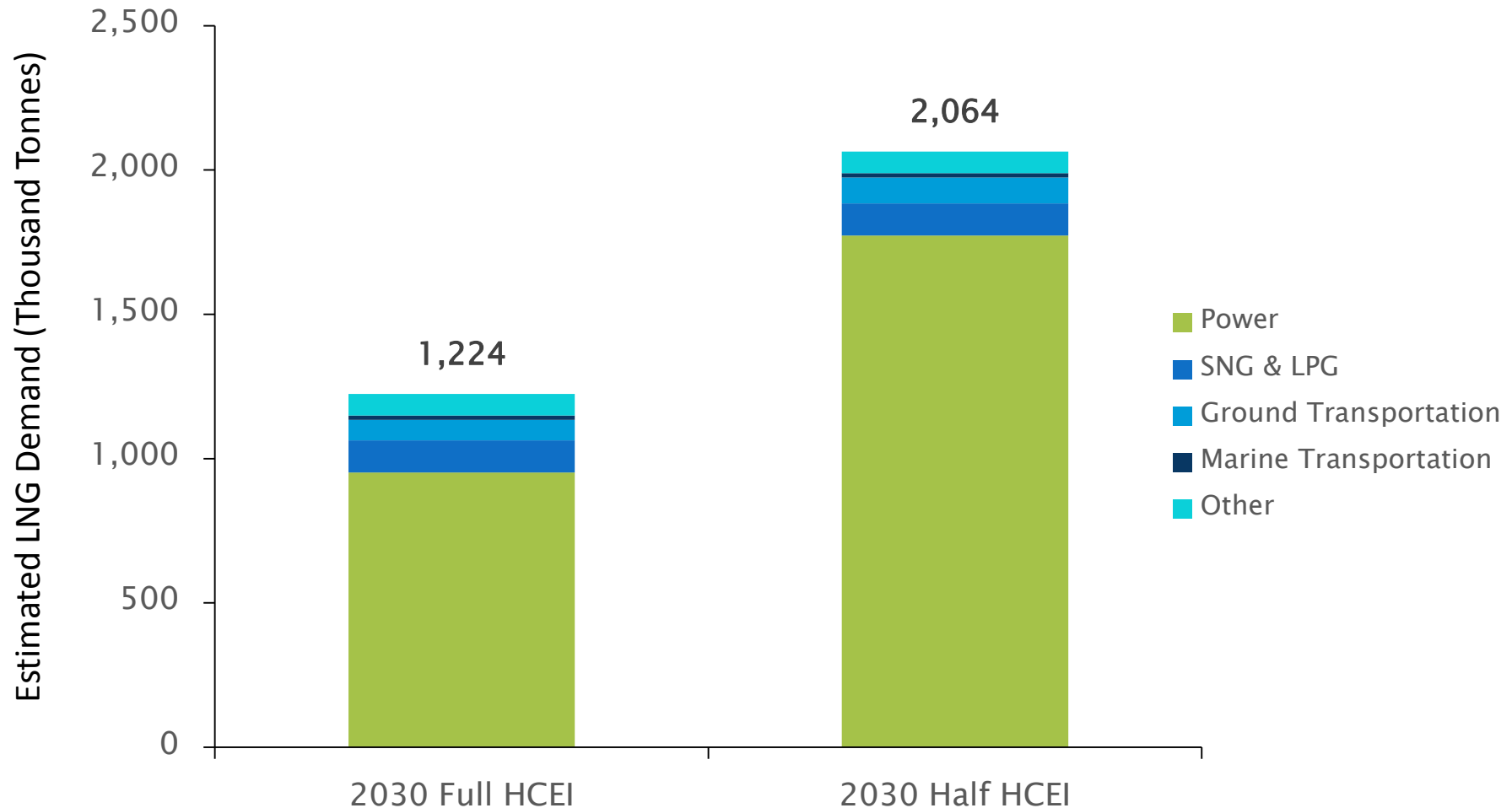
Surface Transport

- LNG Transport fuel companies
- Municipal and private fleet bus companies

Lower Cost by 40% to 50%

# Estimated LNG Demand

*Estimated total LNG demand ranges from 1 to 2 million tonnes*



Source: Hawaii Natural Energy Institute

# LNG Infrastructure Needs

*Hawaii currently does not have the LNG import infrastructure or much of the supporting energy infrastructure for LNG use in the power and transportation industries*

## LNG Import Infrastructure



CNG Fueling Infrastructure



Combined Cycled Gas Turbines



Gas Pipelines

# Bulk and Containerized Solutions

*Utilities are pursuing a bulk LNG solution for the State as well as containerized LNG solutions to meet specific needs*

Elements	ISO Deliveries		Bulk Terminal
	Emergency Backup	Small Scale Ops	
Purpose	SNG system backup	SNG + small scale power and industrial	Large scale power generation + marine & surface transportation
Supply Logistics	ISO container on conventional ships	ISO container on conventional ships	LNG tanker or barge with ongoing ISO
Volume	Back-up for emergency supply system for SNG	SNG + commercial and industrial applications and some power gen	SNG load, Neighbor Islands + Oahu power gen of 600–800 MW + DG/CHP + transport
Infrastructure and Equipment	2 – 3 ISOs 1–2 vaporizers	Additional ISOs and additional vaporizers	LNG terminal facility and distribution infrastructure

# Bulk Model: Joint Development

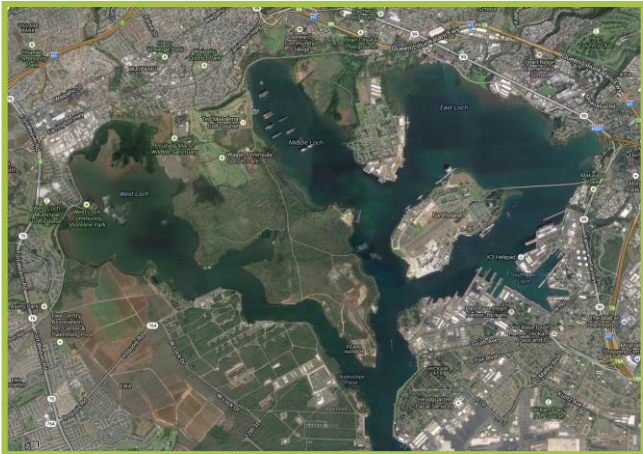
*Each component of the supply chain below will be subject to regulatory oversight and undertaken by the consortium.*

*The consortium's short term activities include, but are not limited to:*

## Defining the roles of consortium members



## Defining site

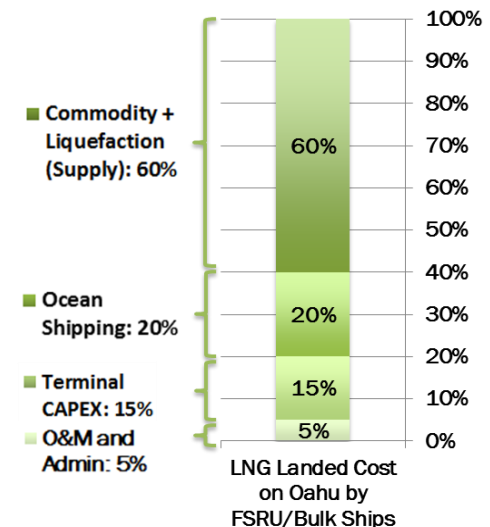


Pearl Harbor



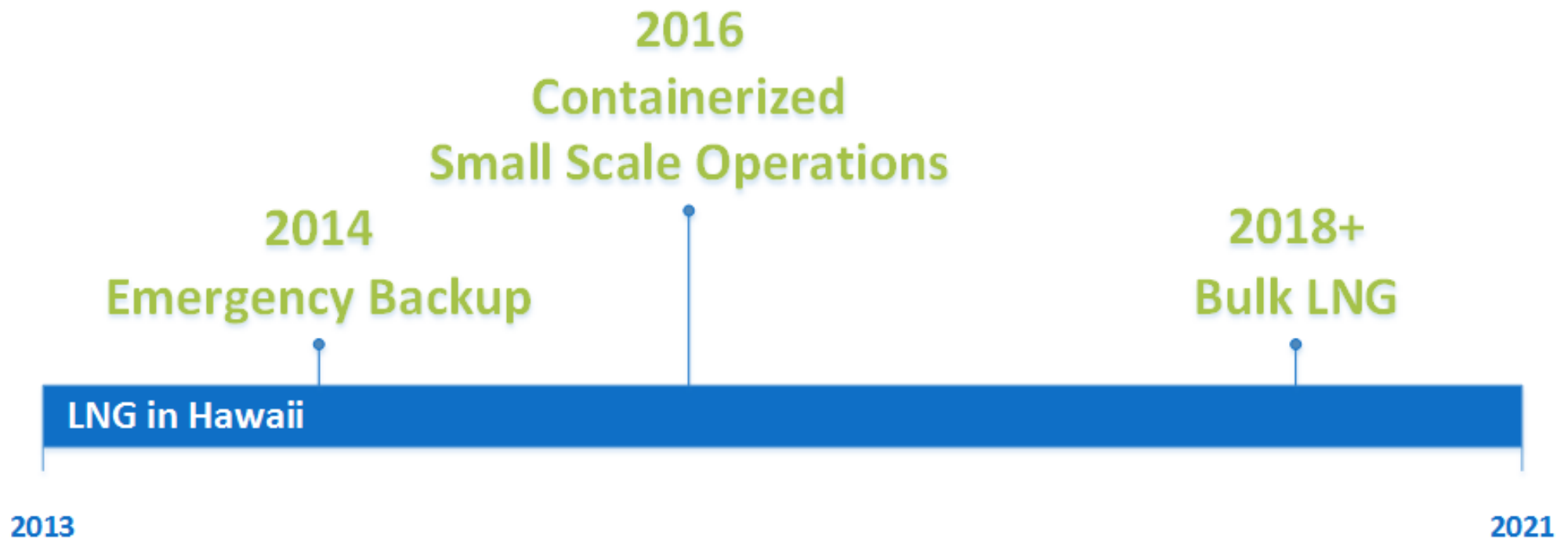
Barber's Point

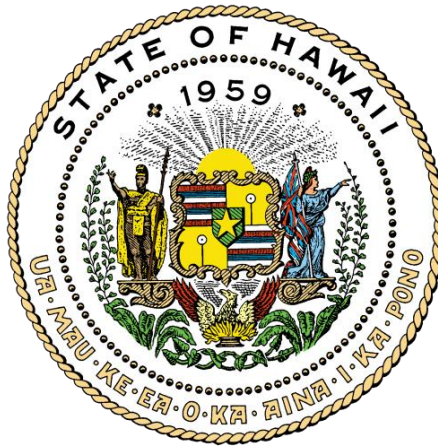
## Identifying volume and pricing



# Timing

*It is anticipated containerized LNG will be available in Hawaii by 2016  
and bulk LNG after 2018*





# Mahalo

Department of Business,  
Economic Development & Tourism

Hawaii State Energy Office  
<http://energy.hawaii.gov>